

2. "Notes on the Polyzoa of the Wenlock Shales, Wenlock Limestone, and Shales over the Wenlock Limestone. From material supplied by G. Maw, Esq., F.L.S., F.G.S." By G. R. Vine, Esq. Communicated by Dr. H. C. Sorby, F.R.S., V.P.G.S.

The author has received from Mr. Maw about $1\frac{1}{2}$ hundredweight of materials washed out of the Wenlock deposits of Shropshire, representing the contents of from 6 to 8 tons of unwashed material. From this material he extracted the specimens of Plants, Actinozoa, Echinodermata, Crustacea, and Polyzoa; and he gave a tabular synopsis of the species and their distribution, with the addition of types from the Wenlock Limestone and of the species of Brachiopoda referred to in a paper by Messrs. Maw and Davidson in the 'Geological Magazine' for 1881.

With regard to the Polyzoa, the author remarked that below the Cretaceous series the two great divisions of Chilostomata and Cyclostomata do not hold good, and suggested that the classification of Palaeozoic Polyzoa should be based on the arrangement and character of the cells, in combination with habit. The forms characterized in the present paper were *Stomatopora dissimilis*, Vine, and vars. *elongata* and *compressa*, *Ascodictyon stellatum*, Nich. & Eth., *A. radiiforme*, sp. n., *A. filiforme*, sp. n. ?, *Spiropora regularis*, sp. n., *S. intermedia*, Vine, *Diastopora consimilis*, Lonsd., *Ceriopora*, Goldf., *Hornera crassa*, Lonsd., *H.?* *delicatula*, sp. n., *Polypora?* *problematica*, sp. n., *Fenestella prisca*, Lonsd., *Glaucome disticha*, Goldf., *Ptilodictya lanceolata*, Lonsd., *P. Lonsdalei*, sp. n., (= *P. lanceolata* auctt.), *P. scalpellum*, Lonsd., *P. interporosa*, Vine, and *P. minuta*, Vine.

MISCELLANEOUS.

On the Postembryonic Development of the Diptera.
By M. H. VIALLANES.

AMONG insects, it is in the Muscidae that we observe the greatest differences between the larva and the perfect animal; and it is also in them that the metamorphoses that take place during the pupal period are the most profound, which explains why exact investigations upon the metamorphoses of insects have been directed principally to these insects or to nearly allied animals. Having repeated the work of my predecessors *, I have been able to discover some new facts, of which I now have the honour to place a summary report before the Academy.

When the larva becomes motionless and transformed into a pupa, not only does the skin of the segments answering to the head and

* My investigations were made in M. Milne-Edwards's laboratory; they relate to *Musca vomitoria*.

thorax of the adult disappear, but the skin of the whole body is destroyed, in consequence of a degeneration of the hypodermic cells, to such an extent that at a certain moment the animal is only limited by a thin cuticle, beneath which is a thick layer of embryonic cells, originating, as described by me in a previous communication*, from the muscular nuclei which have proliferated, and before the invasion of which the contractile substance of the muscular fibres has disappeared.

The embryonic cells which almost completely fill the body of a pupa are not derived from the muscular nuclei alone; they are also formed by the proliferation of the cells of the adipose body. This function of the cells of the adipose body was not previously known. When a larva is on the point of becoming a pupa, numerous daughter cells appear in the midst of their protoplasm; subsequently the envelope and the nucleus of the cells of the adipose body disappear; the daughter cells are set free, multiply in their turn, and display all the characters of embryonic cells.

The return of the tissues to the embryonic state is the cause of this very remarkable fact, that at a certain moment the pupa has really the characters of an embryo. When we examine a section made across the abdomen of a pupa of from two to four days standing, we observe that the body is composed of only two layers of central cells, one forming a solid cord, composed of the epithelial cells of the digestive tube which have reverted to the embryonic state, the other peripheral, consisting of the embryonic cells originating from the muscular nuclei and the cells of the adipose body.

When the tissues of the larva are destroyed, the tissues of the adult form. We know from the investigations of M. Weissmann, that the integuments of the head and thorax are developed at the expense of a certain number of buds preexistent in the larva, and designated *histoblasts* (*Imaginalscheiben*). From not having had recourse to the method of sections, my predecessors have been mistaken as to the structure of these little bodies; they are not, as has been supposed, small saccules filled with cells. The histoblast, when not much developed, appears in a section to consist of a hollow sphere, one half of which had been immersed in the other: we may therefore consider it to be formed of two laminae, an internal and an external one. The inner lamina is thick and composed of pyriform cells placed side by side; the outer lamina is thin and consists of a single layer of flattened cells. During the development of the histoblast the outer lamina disappears, and the inner lamina increases to form the integuments of the adult. The histoblasts of the eyes present the same structure as the others; the following are the only peculiarities observed in them. The inner lamina is composed of large cells, very regularly arranged side by side, of a cylindrical form, terminated at its outer extremity by a flattened base, drawn out into a point at the other extremity. Each of them is continuous by its produced extremity with one of the fibrils of

* See 'Annals,' ser. 5, vol. vii, p. 352.

the optic nerve. Among the large cells small ones are observed. As M. Weissmann has shown, each of the large cells will become one of the simple eyes, the totality of which constitutes the retina. The small cells become the choroid cells.

My predecessors, who had not observed the destruction of the integuments of the later segments of the larva, thought that the integuments of the abdomen of the adult were formed by a simple transformation of the hypodermic cells of the latter. Having already shown that the whole of the skin of the larva disappears, I had to ascertain how the integuments of the abdomen of the adult are developed. I have ascertained that they are formed at the expense of the embryonic cells which fill the body of the pupa, and the origin of which has been indicated above. These embryonic cells become converted into hypodermic cells. This change does not take place at all points of the abdomen at the same time; but, in each segment, the hypodermis of the adult appears at first at four points, two below and two above.

As the organs of the larva disappear, and the organs of the adult are formed, the nervous centres undergo very important internal modifications. Their investigation, which has not even been touched upon, is environed with technical difficulties. I have succeeded in overcoming nearly all of these. I have traced step by step the internal modifications that the nervous centres undergo during pupal life; and I shall shortly have the honour to make known to the Academy the principal results of my researches upon this subject.—*Comptes Rendus*, Nov. 14, 1881, p. 800.

Development of the Ovum of Melicerta. By M. L. JOLIET.

The development of the embryo of the Rotatoria has hitherto been studied only in two genera, namely in *Brachionus* by Salensky, and in *Pedalion* by Barrois. The mode of segmentation is still unknown.

Although we have ascertained that the development of the winter egg and of the male egg agrees generally with that of the female summer egg, it is more particularly upon this last that our investigations have been made.

Within the sac of maturation it presents, in the midst of the germinal vesicle, a small but very distinct germinal spot. After deposition this spot soon disappears. It did not appear to me that there was any emission of a polar globule. The first segmentation-plane, perpendicular to the larger axis of the egg, which is an irregular ovoid, divides it into two very unequal segments. Afterwards these two segments divide symmetrically, and so that each of them furnishes eight of the spheres which constitute the egg in the stage XVI. We observe only that the spheres derived from the larger primary segment are larger than the others, and larger in proportion to their distance from the animal pole. It seems as if each of them had a certain degree of animality. During the whole